



# Computer Information Systems

## Program Information

The Computer Information Systems department at H. Council Trenholm State Community College is progressive and innovative in its approach to remain viable and current with the trends of computer technology and applications. Students enrolled in the CIS Curriculum will gain knowledge and skills that are valuable to a dynamically, changing workforce, including—but not limited to—soft skills and preparation for industry recognized certifications.

Trenholm State will meet student needs for Information Systems Technology training while providing students with effective and personalized instructional methods in a variety of technical concentrations. The CIS program also emphasizes leadership and teamwork, within and throughout the Plan of Study.

## Occupational Choices

At Trenholm State, we teach skills needed by: programmers; computer system analysts; database designers; network designers; Microsoft Certified Desktop Technicians; A+, Security+ and Linux+ Technicians; Cisco CCNA certified networkers; and, Office Technology Specialists with MS Office skills. We also offer others education and training, as well as a full spectrum of soft-skills. Job prospects should be best for college graduates who are up to date with the latest skills and technologies, particularly if they have supplemented their formal education with some relevant work experience and industry recognized certifications. Employers will continue to seek computer specialists who possess a strong background in fundamental computer skills combined with good interpersonal and communication skills. Due to the demand for computer support specialists and systems administrators over the next decade, those who have strong computer skills but do not have a bachelor's degree should continue to qualify for some entry-level positions. However, certifications and practical experience are essential for persons without degrees.

Source: Bureau of Labor and Statistics Occupational Outlook Handbook, 2018-2028 Edition, 2019 Survey

## Average Full-Time Wage

Employment opportunities are expected to grow and earnings can range from entry level positions to much higher incomes for certified and experienced individuals. The average full-time annual wage of a CIS trained IT employee is \$54,760 (Computer Support Specialist) to \$122,840 (Computer and Information Research Scientist), based on skill level, experience, and field of work. Other job titles include: Computer Network Architect (\$112,690); Computer Programmers (\$86,550); Computer Systems Analysts (\$90,920); Database Administrators (\$93,750); Information Security Analysts (\$99,730); Network and Computer System Administrators (\$83,510); Software Developers (\$107,510); and, Web Developers (\$73,760). Other titles and skills also are within these job categories, depending on skills, degree, certifications, experience, availability, relocation, and variable factors of employment.

Source: Bureau of Labor and Statistics Occupational Outlook Handbook, 2018-2028 Edition, 2019 Survey

## Program Contact

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Program Coordinator/Instructor  
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As part of ongoing planning and evaluation, the College regularly evaluates student learning outcomes for each program.

## Estimated Program Length & Cost \*

Award	Length	Credit Hours	Tuition Fees	Books	Tools	Supplies
Associate Degree	6 Terms	76	\$12,236	\$4,555	0	\$250
Short Term Certificate	2-3 Terms	28	\$4,508	\$1,438	0	\$75
Short Term Certificate	2-3 Terms	25	\$4,025	\$450	0	\$75

\* Tax not included. Prices are subject to change without prior notice; cost of books may vary considerably among suppliers. Cost of general education books is in addition to the total listed above. The length of the program is based on full-time status of 12-15 credit hours per term. Enrollment in transitional level general education courses will alter the length of the program.

**Awards Available**Associate in Applied Science Degree  
Computer Information SystemsNetworking  
(Cisco Networking)System Support  
(Microsoft Desktop/Server Support)Programming  
(Object Oriented Programming)Cyber Security  
(Cyber Security)

Program Coding

AWS Cloud Computing

Short Term Certificate  
Computer Information Systems

Cisco Networking

System Support  
(Microsoft Desktop/Server Support)

Web and Database Applications

Object Oriented Programming

Cyber Security

Program Coding

AWS Cloud Computing

\*You must earn a final grade of a 70 ("C") or above to receive credit for CIS courses. Any final grade of 69 or below will constitute failure (F) in the course, and you will have to repeat the course to attempt to earn the appropriate credit. (This does not include CIS-149 or CIS-146).

Associate of Applied Science  
Computer Information Systems**General Education Requirements (18-19 hours)****Area I - Written Composition (6 hours)**

ENG-101	English Composition I	3
ENG-102	English Composition II	3

**Area II - Humanities & Fine Arts (3 hours)**

(Humanities and Arts disciplines include but are not limited to: Area/Ethnic Studies, Art and Art History, Foreign Languages, Music and Music History, Philosophy, Ethics, Religious Studies, Theater and Dance.)

**Note:** If SPH-106, SPH-107, SPA-101 or SPA-102 has been taken an additional 3 semester hours in Humanities and Fine Arts must be taken to satisfy requirements in Area II.

**Arts:**

ART-100	Art Appreciation	3
MUS-101	Music Appreciation	3

**Humanities:**

PHL-106	Intro to Philosophy	3
PHL-206	Ethics & Society	3
REL-100	History of World Religions	3
REL-151	Survey of Old Testament	3
REL-152	Survey of New Testament	3
SPA-101	Intro Spanish I	3
SPA-102	Intro Spanish II	3
SPH-106	Fundamentals of Oral Comm	3
SPH-107	Fundamentals of Public Speaking	3

**Literature:**

ENG-251	American Literature I	3
ENG-252	American Literature II	3
ENG-261	English Literature I	3
ENG-262	English Literature II	3
ENG-271	World Literature I	3
ENG-272	World Literature II	3

**Area III - Natural Science & Mathematics (6-7 hours)**

(In addition to Mathematics, disciplines in the Natural Sciences include: Astronomy, Biological Sciences, Chemistry, Geology, Physical Geography, Earth Science, Physics, and Physical Science.)

**Note:** 3 semester hours in MTH must be completed. Additional hours can be taken in the Natural Science area.

**Mathematics:**

MTH-100	Intermediate Algebra	3
MTH-110	Finite Mathematics	3
MTH-112	Precalculus Algebra	3

**Natural Sciences:**

BIO-101	Introduction to Biology I	4
BIO-103	Principles of Biology I	4
PHS-111	Physical Science I	4
PHS-112	Physical Science II	4
PHY-120	Introduction to Physics	4

**Area IV - History, Social & Behavioral Sciences (3 hours):**

(Social and Behavioral Sciences include, but are not limited to: Anthropology, Economics, Geography, Political Science, Psychology, and Sociology.)

**Note:** Must complete 3 semester hours.

**History:**

HIS-101	Western Civilization I	3
HIS-102	Western Civilization II	3
HIS-121	World History I	3
HIS-122	World History II	3
HIS-201	United States History I	3
HIS-202	United States History II	3

**Social and Behavioral Sciences:**

ECO-231	Principles of Macroeconomics	3
ECO-232	Principles of Microeconomics	3
PSY-200	General Psychology	3
PSY-210	Human Growth and Development	3
SOC-200	Introduction to Sociology	3
POL-200	Introduction to Political Science	3
POL-211	American National Government	3

**Area V: Pre-Professional/College Requirements:**

(Courses appropriate to the degree requirements and major of the individual student and electives.)

**College Requirements:**

ORI-101	Orientation to College	1
CIS-146	Microcomputer Applications	3
CIS-117	Database Mgmt Software Apps	3
CIS-149	Introduction to Computers	3
CIS-157	Intro to App Development with Swift	3
CIS-171	Fundamentals of UNIX/Linux I	3
CIS-201	Intro to Computer Programming	3
CIS-207	Introduction to Web Development	3
CIS-209	Advanced Web Development	3
CIS-238	Cloud Computing: Infrastructure/Svcs	3
CIS-268	Software Support	3
CIS-269	Hardware Support	3
CIS-270	Cisco CCNA I: Networking Funds	3
CIS-271	Cisco CCNA II: Routers & Switches	3
CIS-280	Network Security	3
CIS-281	Systems Analysis & Design	3
	Elective	3

**Area V Credit Hours: 58**

**Total Credit Hours: 76**

**Please Note:**

If completing an Associate degree in CIS from one of the following areas of study: Networking, System Support, Programming, Cyber Security, Program Coding, or AWS Cloud Computing select nine hours.

If completing a general Associate degree in CIS, then choose any nine no concentration is selected, then choose any nine credit hours from a combination of the various areas of study and/or general electives in order to fulfill the 76-credit hour graduation requirement.

Also, please note that some courses listed in the "Course Descriptions" may be offered as needed and may be used as an elective and substituted on a case-by-case basis.

**Networking  
(Cisco Networking)**

CIS-272	Cisco CCNA III: Adv Routers/Switches	3
CIS-273	Cisco CCNA IV: WAN Technologies	3
CIS-172	Fundamentals of UNIX/Linux II	3

**System Support  
(Microsoft Desktop/Server Support)**

CIS-275	Workstation Administration	3
CIS-276	Server Administration	3
CIS-265	End User & Desktop App Support I	3

**Programming  
(Object Oriented Programming)**

(Choose 9 hours)

CIS-212	Visual Basic Programming	3
CIS-213	Advanced Visual Basic Programming	3
CIS-251	C++ Programming	3
CIS-255	JAVA Programming	3
CIS-256	Advanced JAVA	3
CIS-285	Object Oriented Programming	3

**Cyber Security**

(Choose 9 hours)

CIS-211	Principles of Information Assurance	3
CIS-214	Security Testing (Pen Testing)	3
CIS-245	Cyber Defense	3
CIS-246	Ethical Hacking	3
CIS-282	Computer Forensics	3

**Program Coding**

CIS-155	Intro to Mobile App Development or CIS-159 Intro to Graphic Designs for Apps	3
CIS-220	App Development with Swift I	3
CIS-227	App Development with Swift II	3

**AWS Cloud Computing**

CIS-200	Software Design	3
CIS-237	Virtual Infrstr: Install & Configuration	3
CIS-239	Information Storage & Management	3

**General Electives not Associated with any Program Option:**

CIS-182	Help Desk Applications	3
CIS-203	Introduction to Information Highway	3
CIS-208	Web Authoring Software (DreamWeaver)	3
CIS-222	Database Management System	3
CIS-250	E-Commerce	3
CIS-284	CIS Internship	3
CIS-287	SQL Server	3
CIS-294	Special Topics	3
CIS-299	Directed Studies in CIS	3
OAD-103	Intermediate Keyboarding	3
ACT-201	Entrepreneurship	3

**Cross-Reference of Courses-to-Certifications:**

CIS171/172:	Linux+
CIS207/208:	Certified Internet Webmaster
CIS268/269:	A+
CIS270/271:	CCENT & Network+
CIS272/273:	CCNA
CIS280:	Security+
CIS214:	Security Testing (Pen Testing) -> Pentest+
CIS245:	Cyber Defense Certification -> CYSA+
CIS246:	Ethical Hacking Certification -> Certified Ethical Hacking
CIS238:	Cloud Computing: Infrastructure/Svc -> Cloud Practitioner
CIS200:	Software Design -> AWS Certified Developer – Associate
CIS237:	Virtual Infrastructure: Install & Configuration -> AWS Certified Solutions Architect Assoc.
CIS239:	Information Storage & Management -> AWS Certified SysOps Administrator - Associate

Short Term Certificate  
Computer Information Systems  
CISCO Networking

**Area V: Pre-Professional/College Requirements:**

(Courses appropriate to the degree requirements and major of the individual student and electives.)

**College Requirements:**

ORI-101	Orientation to College	1
CIS-149	Introduction to Computers	3
CIS-171	Fundamentals of UNIX/Linux I	3
CIS-172	Fundamentals of UNIX/Linux II	3
CIS-268	Software Support	3
CIS-269	Hardware Support	3
CIS-270	Cisco CCNA I: Networking Fund	3
CIS-271	Cisco CCNA II: Routers & Switches	3
CIS-272	Cisco CCNA III: Adv Rtrs/Switches	3
CIS-273	Cisco CCNA IV: WAN Technologies	3

Suggested Sequence: Semester 1: 101, 149, 171, 268, 270, Semester 2: 172, 269, 271, 272, Semester 3: 273.

**Total Credit Hours: 28**

**This certificate as listed may require additional pre-requisites or co-requisites**

Short Term Certificate  
Computer Information Systems  
System Support

**Area V: Pre-Professional/College Requirements:**

(Courses appropriate to the degree requirements and major of the individual student and electives.)

**College Requirements:**

ORI-101	Orientation to College	1
CIS-149	Introduction to Computers	3
CIS-171	Fundamentals of UNIX/Linux I	3
CIS-182	Help Desk Applications	3
CIS-265	End User/Desktop Apps Support I	3
CIS-268	Software Support	3
CIS-269	Hardware Support	3
CIS-275	Workstation Administration	3
CIS-276	Server Administration	3
CIS-280	Network Security	3

Suggested Sequence: Semester 1: 101, 149, 171, 268, 275; Semester 2: 276, 280, 265, 269; Semester 3: 182.

**Total Credit Hours: 28**

**This certificate as listed may require additional pre-requisites or co-requisites**

Short Term Certificate  
Computer Information Systems  
Web and Database Applications

**Area V: Pre-Professional/College Requirements:**

(Courses appropriate to the degree requirements and major of the individual student and electives.)

**College Requirements:**

ORI-101	Orientation to College	1
CIS-117	Database Mgmt Software Apps	3
CIS-171	Fundamentals of UNIX/Linux I	3
CIS-207	Introduction to Web Development	3
CIS-208	Web Authoring Software	3
CIS-209	Advanced Web Development	3
CIS-222	Database Management Systems	3
CIS-250	E-Commerce	3
CIS-285	Object Oriented Programming	3
CIS-287	SQL Server	3

Suggested Sequence: Semester 1: 101, 117, 171, 207, 285; Semester 2: 209, 222, 250, 287; Semester 3: 208.

**Total Credit Hours: 28**

**This certificate as listed may require additional pre-requisites or co-requisites**

Short Term Certificate  
Computer Information Systems  
Object Oriented Programming

**Area V: Pre-Professional/College Requirements:**

(Courses appropriate to the degree requirements and major of the individual student and electives.)

**College Requirements:**

ORI-101	Orientation to College	1
CIS-149	Introduction to Computers	3
CIS-201	Intro to Computer Programming	3
CIS-207	Introduction to Web Development	3
CIS-209	Advanced Web Development	3
CIS-212	Visual Basic Programming	3
CIS-213	Adv Visual Basic Programming	3
CIS-255	JAVA Programming	3
CIS-256	Advanced JAVA	3
CIS-285	Object Oriented Programming	3

Suggested Sequence: Semester 1: 101, 149, 201, 212, 255; Semester 2: 207, 213, 256, 285; Semester 3: 209. Recommend CIS-281 Systems Analysis & Design.

**Total Credit Hours: 28**

**This certificate as listed may require additional pre-requisites or co-requisites**

### Short Term Certificate Computer Information Systems Cyber Security

**Area V: Pre-Professional/College Requirements:**  
(Courses appropriate to the degree requirements and major of the individual student and electives.)

**College Requirements:**

ORI-101	Orientation to College	1
CIS-149	Introduction to Computers	3
CIS-171	Fundamentals of UNIX/Linux I	3
CIS-211	Principles of Information Assurance	3
CIS-214	Security Testing (Pen Testing)	3
CIS-245	Cyber Defense	3
CIS-246	Ethical Hacking	3
CIS-280	Network Security	3
CIS-282	Computer Forensics	3
CIS-270	Cisco I	3
	OR CIS-284 CIS Internship	

Suggested Sequence: Semester 1: 101, 149, 171, 270, 280; Semester 2: 211, 214, 245; Semester 3: 246, 282

**Total Credit Hours: 28**

**This certificate as listed may require additional pre-requisites or co-requisites**

### Short Term Certificate Computer Information Systems AWS Cloud Computing

**Area V: Pre-Professional/College Requirements:**  
(Courses appropriate to the degree requirements and major of the individual student and electives.)

**College Requirements:**

ORI-101	Orientation to College	1
CIS-117	Database Management Software	3
CIS-171	Fundamentals of UNIX/Linux I	3
CIS-200	Software Design	3
CIS-222	Database Management System	3
CIS-238	Cloud Computing: Infrastructure and services	3
CIS-237	Virtual Infrastructure: Installation and Configuration	3
CIS-239	Information Storage and Management	3
CIS-270	Cisco CCNA I: Networking Funds	3
CIS-280	Network Security	3

Suggested Sequence: Semester 1: 101, 117, 270, 171; Semester 2: 222, 237, 239, 280; Semester 3: 200, 238.

**Total Credit Hours: 28**

**This certificate as listed may require additional pre-requisites or co-requisites**

### Short Term Certificate Computer Information Systems Program Coding

**Area V: Pre-Professional/College Requirements:**  
(Courses appropriate to the degree requirements and major of the individual student and electives.)

**College Requirements:**

ORI-101	Orientation to College	1
CIS-149	Introduction to Computers	3
CIS-157	Intro to App Development with Swift	3
CIS-159	Intro to Graphic Design for Apps or CIS-155 Intro to Mobile App Dev	3
CIS-201	Intro to Computer Programming	3
CIS-212	Visual Basic	3
CIS-220	App Development with Swift I	3
CIS-227	App Development with Swift II	3

Suggested Sequence: Semester 1: 101, 149, 157, 201; Semester 2: 212, 220, 159; Semester 3: 227

**Total Credit Hours: 25**

**This certificate as listed may require additional pre-requisites or co-requisites**

## Course Descriptions Computer Information Systems

Course #	Course Title	Credit Hours
<b>ACT-201</b>	<b>ENTREPRENEURISM</b> PREREQUISITE: None. This course covers the important issues and critical steps involved in starting a new business from scratch. Topics covered include developing a business plan, creating a successful marketing strategy, setting up the legal basis for business, raising start-up funds, attracting and managing human resources, managing costs, and developing a custom base.	<b>3</b>
<b>CIS-103</b>	<b>INTRODUCTORY COMPUTER SKILLS II</b> This course is for students without a high school diploma or GED. This course is not creditable toward associate degree requirements. This course is designed to focus on the development of computer skills suited to the needs of students in non-degree occupational programs. The course will generally use software packages appropriate to occupational programs and may include such topics as word processing, database, basic graphics, spreadsheets or other features typically needed in the field. Upon completion, the student will be able to demonstrate proficiency by the completion of appropriate assignments and occupation-specific applications.	<b>3</b>
<b>CIS-117</b>	<b>DATABASE MGMT SOFTWARE APPLICATIONS</b> PREREQUISITE: CIS-146 OR Permission of Instructor This course provides students with hands-on experience using database management software. Students will develop skills common to most database management software by developing a wide variety of databases. Emphasis is on planning, developing, and editing functions associated with database management.	<b>3</b>
<b>CIS-146</b>	<b>MICROCOMPUTER APPLICATIONS</b> PREREQUISITE: None This course is an introduction to the most common microcomputer software applications. These software packages should include typical features of applications, such as word processing, spreadsheets, database management, and presentation software. Upon completion, students will be able to utilize selected features of these packages. This course will help prepare students for the MOS and IC3 certification.	<b>3</b>
<b>CIS-149</b>	<b>INTRODUCTION TO COMPUTERS</b> PREREQUISITE: None This course is an introduction to computers and their impact on society. The course covers the development of computers, their impact on society, as well as future implications of development of computer and related communication technologies. This course introduces programming and computer operating systems. Upon completion, students will have basic knowledge of computer technology and will be able to perform basic functions with a computer system. The course will help prepare students for the IC3 certification.	<b>3</b>
<b>CIS-155</b>	<b>INTRODUCTION TO MOBILE APP DEVELOPMENT</b> PREREQUISITE: CIS-201 OR Permission of Instructor The purpose of this course is to introduce students to various app development tools for various mobile platforms. Specific topics include: app distribution sources, mobile device operating systems, survey of app development software, processes for design, build, deploying, and optimizing apps. At the conclusion of this course students will be able to design, build, deploy, and optimize a basic app.	<b>3</b>
<b>CIS-157</b>	<b>INTRODUCTION TO APP DEVELOPMENT WITH SWIFT</b> PREREQUISITE: High School Graduate or GED This introductory one-semester course is designed to help students build a solid foundation in programming fundamentals using Swift as the language. Students get practical experience with the tools, techniques, and concepts needed to build a basic iOS system.	<b>3</b>
<b>CIS-159</b>	<b>INTRODUCTION TO GRAPHIC DESIGN FOR APPS</b> PREREQUISITE: High School Graduate or GED This introductory one-semester course is designed to enable students to integrate graphics for mobile app development. Students receive practical experience with the tools, techniques, and concepts needed to build or incorporate basic graphics.	<b>3</b>
<b>CIS-171</b>	<b>LINUX I</b> PREREQUISITE: CIS-149 OR Permission of Instructor This course presents fundamental applications in UNIX/Linux. Included in this course are skills development for OS installation and setup, recompile techniques, system configuration settings, file/folder structures and types, run levels, basic network applications, and scripting. Additionally, the course presents security features from an administrative and user consideration.	<b>3</b>

<b>Course #</b>	<b>Course Title</b>	<b>Credit Hours</b>
<b>CIS-172</b>	<b>LINUX II</b> PREREQUISITE: CIS-171 OR Permission of Instructor This course is a continuation of CIS171 and includes advanced features of UNIX/Linux. Included in the course are web applications, integrated network configurations, file transfer, server administration, system controls, IP tables/firewall to secure UNIX/Linux systems, and strategic user-group applications specific to administrative network control.	<b>3</b>
<b>CIS-182</b>	<b>HELP DESK APPLICATIONS</b> PREREQUISITE: CIS-149 OR Permission of Instructor The main purpose of this course is to provide students with a comprehensive understanding of the helpdesk environment and the knowledge, skills, and abilities necessary to work in the user support industry. Students will learn problem-solving and communication skills that are very valuable when providing user support. Through hands-on exercises and case projects students will learn how to apply their knowledge and develop their ideas and skills.	<b>3</b>
<b>CIS-200</b>	<b>SOFTWARE DESIGN</b> PREREQUISITE: CIS-238 & CIS-201 This course includes instruction in critical thinking, problem solving skills, and essential programming logic in structured and object-oriented design, using contemporary tools.	<b>3</b>
<b>CIS-201</b>	<b>INTRO TO COMPUTER PROGRAMMING CONCEPTS</b> PREREQUISITE: CIS-149 OR Permission of Instructor This course presents fundamental programming concepts. Included in this course are problem solving and algorithms, various design tools, programming structures, variable data types and definitions, modularization, and selected programming languages. Techniques are introduced to enable students to develop programs. As part of this course, students will apply programming concepts in CIS 202, which is a PREREQUISITE for this course. This course is a suitable substitution for the programming core of the AAT and AAS CIS programs.	<b>3</b>
<b>CIS-203</b>	<b>INTRO TO THE INFORMATION HIGHWAY</b> PREREQUISITE: CIS-149 OR Permission of Instructor This course introduces students to basic principles of the information highway. Students are exposed to different network information tools such as electronic mail, network news, browsers, commercial information services, appropriate editors, and Web authoring software.	<b>3</b>
<b>CIS-207</b>	<b>INTRODUCTION TO WEB DEVELOPMENT</b> PREREQUISITE: CIS-149 OR Permission of Instructor This course provides students with opportunities to learn Hypertext Markup Language, cascading style sheets, and Java Script. At the conclusion of this course, students will be able to use specified markup languages to develop basic Web pages.	<b>3</b>
<b>CIS-208</b>	<b>WEB AUTHORIZING SOFTWARE</b> PREREQUISITE: CIS-149 OR Permission of Instructor This course builds upon basic skills in Web authoring. Various Web authoring tools are introduced. Upon completion students will be able to use these tools to enhance Web sites.	<b>3</b>
<b>CIS-209</b>	<b>ADVANCED WEB DEVELOPMENT</b> PREREQUISITE: CIS-207 This is an advanced Web design course emphasizing the use of scripting languages to develop interactive Web sites. Upon completion students will be able to create data driven Web sites. This course helps prepare students for the Certified Internet Webmaster (CIW) Foundations certification.	<b>3</b>
<b>CIS-211</b>	<b>PRINCIPLES OF INFORMATION ASSURANCE</b> PREREQUISITE: CIS-149 OR Permission of Instructor This course is designed to introduce students to information security principles. Topics covered in this course will include the need for security, risk management, security technology, cryptography, and physical security. Security policies and legal/ethical issues will also be covered.	<b>3</b>
<b>CIS-212</b>	<b>VISUAL BASIC PROGRAMMING</b> PREREQUISITE: CIS-201 OR Permission of Instructor This course emphasizes BASIC programming using a graphical user interface. The course will emphasize graphical user interfaces with additional topics on such topics as advanced file handling techniques, simulation, and other selected areas. Upon completion, the student will be able to demonstrate knowledge of the topics through the completion of programming projects and appropriate tests.	<b>3</b>
<b>CIS-213</b>	<b>ADVANCED VISUAL BASIC PROGRAMMING</b> PREREQUISITE: CIS-212 This course is a continuation of CIS-212, Visual Basic Programming.	<b>3</b>

<b>Course #</b>	<b>Course Title</b>	<b>Credit Hours</b>
<b>CIS-214</b>	<b>SECURITY ANALYSIS (PEN TESTING)</b> PREREQUISITE: CIS-149 OR Permission of Instructor This course introduces students to the concept of security analysis, or penetration testing, of information systems. Students will evaluate the security of a computer system or network, assessing security risks from the position of a potential attacker. Emphasis is on identifying security flaws and providing technical solutions.	<b>3</b>
<b>CIS-220</b>	<b>APP DEVELOPMENT WITH SWIFT I</b> PREREQUISITE: CIS-157 OR Permission of Instructor This is the first of two courses designed to teach specific skills related to app development using Swift language.	<b>3</b>
<b>CIS-222</b>	<b>DATABASE MANAGEMENT SYSTEMS</b> PREREQUISITE: CIS-117 OR Permission of Instructor This course will discuss database system architectures, concentrating on Structured Query Language (SQL). It will teach students how to design, normalize and use databases with SQL, and to link those to the Web.	<b>3</b>
<b>CIS-227</b>	<b>APP DEVELOPMENT WITH SWIFT II</b> PREREQUISITE: CIS-220 OR Permission of Instructor This course focuses on building specific features for iOS apps. Students apply their knowledge and skills to developing new apps.	<b>3</b>
<b>CIS-237</b>	<b>VIRTUAL INFRASTRUCTURE: INSTALLATION AND CONFIGURATION</b> PREREQUISITE: CIS-171 & CIS-238 Students explore concepts and capabilities of virtual architecture with a focus on the installation, configuration, and management of a virtual infrastructure, an ESX Server, and a Virtual Center. Covers fundamentals of virtual network design and implementation, fundamentals of storage area networks, virtual switching, virtual system management and engineering for high availability.	<b>4</b>
<b>CIS-238</b>	<b>CLOUD COMPUTING: INFRASTRUCTURE AND SERVICES</b> PREREQUISITE: CIS-149 This course focuses on cloud infrastructure, deployment, security models, and the key considerations in migrating to cloud computing. Coverage includes the technologies and processes required to build traditional, virtualized and cloud data center environments, including computation, storage, networking, desktop and application virtualization, business continuity, security and management.	<b>3</b>
<b>CIS-239</b>	<b>INFORMATION STORAGE &amp; MANAGEMENT</b> PREREQUISITE: CIS-238 & CIS-171 This course focuses on advanced storage systems, protocol, and architectures, including Storage Area Networks (SAN), Network Attached Storage (NAS), Fibre Channel Networks, Internet Protocol SANS (IPSAN), iSCSI, and Content Addressable Storage (CAS).	<b>3</b>
<b>CIS-245</b>	<b>CYBER DEFENSE</b> PREREQUISITE: CIS-149 OR Permission of Instructor The course provides students with information on the concept of cyber defense. Topics include information relative to legal aspects of cyber-attacks, threats to various levels of national and local social infrastructure, financial systems, personal data, and other direct and indirect threats. As part of this course students explore current and historical cyber threats and U.S. policy regarding infrastructure protection.	<b>3</b>
<b>CIS-246</b>	<b>ETHICAL HACKING</b> PREREQUISITE: CIS-149 OR Permission of Instructor This course emphasizes scanning, testing, and securing computer systems. The lab-intensive environment provides opportunities to understand how perimeter defenses work and how hackers are able to compromise information systems. With awareness of hacking strategies, students learn to counteract those attempts in an ethical manner.	<b>3</b>
<b>CIS-250</b>	<b>E-COMMERCE</b> PREREQUISITE: CIS-149 OR Permission of Instructor This course is an introduction into e-commerce. Topics include marketing, building an e-commerce store, security, and electronic payment systems. Upon completion students will be able to build an e-commerce presence.	<b>3</b>
<b>CIS-251</b>	<b>C++ PROGRAMMING</b> PREREQUISITE: CIS-201 OR Permission of Instructor This course is an introduction to the C++ programming language including object oriented programming. Topics include: problem solving and design; control structures; objects and events; user interface construction; and document and program testing.	<b>3</b>



<b>Course #</b>	<b>Course Title</b>	<b>Credit Hours</b>
<b>CIS-255</b>	<b>JAVA PROGRAMMING</b> PREREQUISITE: CIS-201 OR Permission of Instructor This course is an introduction to the Java programming language. Topics in this course include object-oriented programming constructs, Web page applet development, class definitions, threads, events and exceptions. Upon completion, the student will be able to demonstrate knowledge of the topics through the completion of programming projects and appropriate tests.	<b>3</b>
<b>CIS-256</b>	<b>ADVANCED JAVA</b> PREREQUISITE: CIS-255 This course is a second course of a sequence using the Java programming language. Topics include: Sun's Swing GUI components, JDBC, JavaBeans, RMI, servlets, and Java media framework. Upon completion, the student will be able to demonstrate knowledge of the topics through programming projects and appropriate exams.	<b>3</b>
<b>CIS-265</b>	<b>END USER AND DESKTOP APPLICATIONS SUPPORT I</b> PREREQUISITE: CIS-149 OR Permission of Instructor This course covers the knowledge and skills necessary to support desktop operating systems in a corporate or small business environment.	<b>3</b>
<b>CIS-268</b>	<b>SOFTWARE SUPPORT</b> PREREQUISITE: CIS-149 OR Permission of Instructor This course provides students with hands-on practical experience in installing computer software, operating systems, and trouble-shooting. The class will help to prepare participants for the A+ Certification sponsored by CompTIA. This is a CORE course.	<b>3</b>
<b>CIS-269</b>	<b>HARDWARE SUPPORT</b> PREREQUISITE: CIS-149 OR Permission of Instructor This course provides students with hands-on practical experience in installation and troubleshooting computer hardware. The class will help to prepare participants for the A+ Certification sponsored by CompTIA. This is a CORE course.	<b>3</b>
<b>CIS-270</b>	<b>CISCO/CCNA I</b> PREREQUISITE: CIS-149 OR Permission of Instructor This course is the first part of a four-part curriculum leading to Cisco Certified Network Associate (CCNA) certification. The content of this course is based on current requirements from the CISCO Networking Academy certification standards.	<b>3</b>
<b>CIS-271</b>	<b>CISCO/CCNA II</b> PREREQUISITE: CIS-270 OR Permission of Instructor This course is the second part of a four-part curriculum leading to Cisco Certified Network Associate (CCNA) certification. The content of this course is based on current requirements from the Cisco Networking Academy certification standards.	<b>3</b>
<b>CIS-272</b>	<b>CISCO CCNA III</b> PREREQUISITE: CIS-271 OR Permission of Instructor This course is the third part of a four-part curriculum leading to Cisco Certified Network Associate (CCNA) certification. The content of this course is based on current requirements from the Cisco Networking Academy certification standards.	<b>3</b>
<b>CIS-273</b>	<b>CISCO CCNA IV</b> PREREQUISITE: CIS-272 OR Permission of Instructor This course is the fourth part of a four-part curriculum leading to Cisco Certified Network Associate (CCNA) certification. The content of this course is based on current requirements from the Cisco Networking Academy certification standards.	<b>3</b>
<b>CIS-275</b>	<b>WORKSTATION ADMINISTRATION</b> PREREQUISITE: CIS-149 or Permission of Instructor This course provides a study of client system administration in a network environment. Topics include installing, monitoring, maintaining, and troubleshooting client operating system software and managing hardware devices and shared resources. Students gain hands-on experience in client operating system installation and basic administration of network workstations.	<b>3</b>
<b>CIS-276</b>	<b>SERVER ADMINISTRATION</b> PREREQUISITE: CIS-275 OR Permission of Instructor This course introduces network operating system administration. Topics included in this course are network operating system software installation, administration, monitoring, and maintenance; user, group, and computer account management; shared resource management; and server hardware management. Students gain hands-on experience in managing and maintaining a network operating system environment.	<b>3</b>

Course #	Course Title	Credit Hours
<b>CIS-280</b>	<b>NETWORK SECURITY</b> PREREQUISITE: CIS-268, CIS-269 or CIS-270 OR Permission of Instructor This course provides a study of threats to network security and methods of securing a computer network from such threats. Topics included in this course are security risks, intrusion detection, and methods of securing authentication, network access, remote access, Web access, and wired and wireless network communications. Upon completion students will be able to identify security risks and describe appropriate counter measures.	3
<b>CIS-281</b>	<b>SYSTEM ANALYSIS &amp; DESIGN</b> PREREQUISITE: CIS-201 OR Permission of Instructor This course is a study of contemporary theory and systems analysis and design. Emphasis is placed on investigating, analyzing, designing, implementing, and documenting computer systems. Upon completion, the student will be able to demonstrate knowledge of the topics through the completion of programming projects and appropriate tests.	3
<b>CIS-282</b>	<b>COMPUTER FORENSICS</b> PREREQUISITE: CIS-149 OR Permission of Instructor This course introduces students to methods of computer forensics and investigations. This course helps prepare students for the International Association of Computer Investigative Specialists (IACIS) certification.	3
<b>CIS-284</b>	<b>CIS INTERNSHIP</b> PREREQUISITE: Within 2 semesters of graduation OR EXPRESS Permission of Instructor This course is designed to provide the student with an opportunity to work in a degree/program related environment. Emphasis is placed on the student's "real world" work experience as it integrates academics with practical applications that relate meaningfully to careers in the computer discipline. Significance is also placed on the efficient and accurate performance of job tasks as provided by the "real world" work experience. Grades for this course will be based on a combination of the employer's evaluation of the student, and the contents of a report submitted by the student. Upon completion of this course, the student should be able to demonstrate the ability to apply knowledge and skills gained in the classroom to a "real world" work experience.	3
<b>CIS-285</b>	<b>OBJECT ORIENTED PROGRAMMING</b> PREREQUISITE: CIS-201 OR CIS-212 OR Permission of Instructor This course is an advanced object-oriented programming course and covers advanced program development techniques and concepts in the context of an object-oriented language. Subject matter includes object-oriented analysis and design, encapsulation, inheritance, polymorphism (operator and function overloading), information hiding, abstract data types, reuse, dynamic memory allocation, and file manipulation. Upon completion, students should be able to develop a hierarchical class structure necessary to the implementation of an object-oriented software system.	3
<b>CIS-287</b>	<b>SQL SERVER</b> PREREQUISITE: CIS-117 OR Permission of Instructor This course will provide students with the technical skill required to install, configure, administer and troubleshoot SQL Server client/server database management system. At the completion of this series students will be able to: identify the features of SQL Server and the responsibilities and challenges in system administration; identify the benefits of integrating SQL Server and setup clients for SQL Server; install and configure SQL Server; manage data storage using database devices and partition data using segments; manage the user accounts; manage user permissions; identify the various task scheduling and alerting abilities of SQL Executive; identify the concepts used in replication and implement replication of data between two SQL Services; identify the types of backup and create backup devices; identify the factors effecting SQL Server performance and the need for monitoring and tuning; locate and troubleshoot problems that occur on the SQL Server.	3
<b>CIS-294</b>	<b>SPECIAL TOPICS</b> PREREQUISITE: Permission of Instructor This course allows study of currently relevant computer science topics, with the course being able to be repeated for credit for each different topic covered. Course content will be determined by the instructor and will vary according to the topic being covered. Upon completion, the student will be able to demonstrate knowledge of the course topic through completion of assignments and appropriate tests.	3
<b>CIS-299</b>	<b>DIRECTED STUDIES IN COMPUTER SCIENCE</b> PREREQUISITE: Permission of Instructor This course allows independent study under the direction of an instructor. Topics to be included in the course material will be approved by the instructor prior to or at the beginning of the class. Upon completion, the student will be able to demonstrate knowledge of the topics as specified by the instructor.	3